N° X.

REGULATING THE STRAIN ON TACKLES.

The LARGE SILVER MEDAL *was this Session presented to Mr.* J. EVANS, 12, *Ellen Terrace, Ellen Street, St. George's in the East, for his* METHOD OF REGULATING THE STRAIN UPON TACKLES *combined in one Effort, according to the relative Powers of such Tackles. A Model of Mr. Evans's Apparatus is placed in the Society's Repository.*

MR. EVANS stated before the committee that he is in the service of the London Dock Company, in which situation he has frequently had occasion to observe the difficulty experienced in raising large logs of timber, or heavy blocks of marble from the holds of ships, from barges or other craft, to the top of the wharfs. No single crane, or tackle, being adequate to the required effort, it is necessary to combine two or more; but in these circumstances no mode being practised of proportioning the strain upon each machine according to its strength, it not unfrequently happened that one tackle being overloaded gave way, the consequence of which was, the failure of the others also: hence originate loss of time, destruction of machinery, and the risk of serious accidents to the labourers employed. On one occasion, when a large block of marble was in the act of being raised, the fall broke

from over-straining, and the side of the ship sustained much damage from the accident; on another occasion the legs of the sheer gave way, and, in consequence, the tackle, crane, marble, and barge, all went down to the bottom together.

In order to prevent the recurrence of such accidents, Mr. Evans invented the mode of combination about to be described, and the directors of the Dock Company have carried it into execution.

In discharging the cargoes of ships, and on other occasions, requiring great weights to be lifted, it often occurs that a single crane, or windlass, or crab, or other similar instrument, is insufficient for the purpose. The power of two or more, therefore, must be combined, in which case the practical difficulty occurs, how to combine machines of equal or different powers, so as that each shall bear its proportional load, not only at the commencement but during the whole of the operation. It is manifest that if each engine has an independent hold of the weight to be raised, the partition of the load among the engines according to the relative power of each is mere accident. A rope, or bridle, of sufficient strength to sustain the whole weight must, therefore, be properly fixed, the power of each engine being then applied to the bridle by means of its own block, or tackle, it is obvious that the load will be equally divided among all the engines; and if in the progress of the work any of the engines does more or less than its due proportion, the block of such engine will advance faster or slower than the other blocks, and thus, by indicating the irregularity, offers at the same time the means of rectifying it by taking care that the block of each engine advances at an equal rate.

Up to this point, Mr. Evans's contrivance (though original on his part) is not new, it having been proposed three years

ago to the Society by Mr. Parsons, as a mode of equalizing the strain on many capstans, when applied to drawing a vessel up a slip or into a repairing dock. But Mr. Evans has besides taken advantage of the mechanical power of very easy combinations of pullies, so as to divide the load, according to the original difference in strength, between different machines combined in one effort, as well as to preserve the same proportional partition during the continuance of such effort. This will be evident from inspection of plate XV, in which

Fig. 1 is a side view of a crane, &c.

Fig. 2 represents a derrick and a crab, with a pair of blocks and fall, &c.

The crane is supposed to be capable of lifting double the weight of the derrick, &c.; they are both represented as applied to lifting a block of marble.

The regulator in this case consists of a moveable and fixed pulley *a* and *b*, together with a chain *c*; *d* is a block of marble or any other weight to be lifted, with a chain or slings fixed round it, for hooking or fixing the regulator to; the moveable pulley is hooked on to the end of the crane chain; one end of the chain *c* is hooked to the chain or slings *e*, and passed over the moveable pulley *a*, and under the fixed pulley *b*, and is then fixed to the hook of the lower block *f*; it will be obvious, by this arrangement, that the crane can only lift two-thirds of the weight and the crab one-third, as long as the pulley *a* and the block *f* are nearly level with each other; but in case the crane hoists faster than the crab, &c. the block *f* will be brought in contact with the fixed pulley *b*, then the crane will have the whole of the weight to lift; or in case the crab, &c. hoists faster than the crane, the pulley *a* will be brought in contact with the pulley *b*, and then the crab, &c. will have the whole of the weight to lift.

Fig. 3 represents a method of fixing a regulator when two powers of equal strength are to be applied.

The power is to be applied to the upper rings, or hooks, and the weight to the lower hooks of all the following figures.

Figs. 4 and 5 represent two methods of fixing a regulator when these powers are to be applied, the first power to lift one half and the other two to lift one-fourth each.

Fig. 6 represents two methods of fixing a regulator; the first, when three powers of equal strength are to be applied; the second, when three powers are to be applied, the first to lift two-thirds and the other two to lift one-sixth of the weight each: the only difference between this arrangement and the last is, that the pulley *j* is removed and hooked on to the ring *k*.

Fig. 7 and 8 represent two methods of fixing a regulator, when four powers of equal strength are to be applied.

Fig. 9 represents a third method of fixing a regulator, when four powers are to be applied; the first power 1 to lift half, the second power 2 to lift a quarter, and the third and fourth powers to lift one-eighth each.

Fig. 10 represents a fourth method of fixing a regulator, when four powers are to be applied; the two first powers to be applied to the hooks 1 and 2, which will lift two-sixths each; the two second powers to be applied to the rings 3 and 4, which will lift one-sixth each. And by extending the same principle any number of powers may be applied to lift any weight with safety.